GLOSSARY OF COMPUTER GRAPHICS TERMS

MEGATEK CORPORATION

Preface

MEGATEK is pleased to make this Glossary of Computer Graphics Terms available as a service to the graphics community. As we fully anticipate the Glossary to grow in parallel with the dynamic growth of the graphics industry, any comments or additions to be incorporated in future issues are most welcome.

Glossary of Computer Graphics Terms

A

Absolute Vector — A VECTOR whose ENDPOINTS are defined in terms of units from the specified ORIGIN.

Additive Color — Colors produced by adding varying INTENSITY LEVELS of the red, green, and blue color components.

Address Space — See DEVICE SPACE.

Addressability — The range of ADDRESSABLE POINTS or DEVICE COORDINATES.

Addressable Point — Any position specifiable in DEVICE COORDINATES.

Aiming Symbol — See TRACKING SYMBOL.

Aliasing — The visual effects that occur when the detail of an IMAGE exceeds the RESOLUTION of the DEVICE SPACE, i.e. a stair-step line on a RASTER DISPLAY.

Alphanumeric Display — A CRT DISPLAY used to display TEXT STRINGS.

Analog Color — The assignment of black and white VIDEO SIGNAL levels to an RGB Value. See DENSITY SLICING.

Analog Vector Generator — A device which takes ENDPOINT COORDINATE data and converts it to deflection signals for the ELECTRON GUN.

Annotation — The presence of textual descriptions on a DISPLAY.

Anti-Aliasing — A process which removes the effects of PIXEL addressing on a RASTER DISPLAY, i.e. stair-step lines appear continuous.

Appearance — A PRIMITIVE ATTRIBUTE which specifies an INTENSITY LEVEL on a CALLIGRAPHIC DISPLAY or a color on a RASTER DISPLAY.

Area Fill Processor — See FILL.

Assembly Drawing — A CAD/CAM DISPLAY which represents a major subdivision of a final product.

Associative Dimensioning — To update the respective dimensions of CAD/CAM DISPLAY GROUPS as the dimensions of their DISPLAY ENTITIES change.

Attribute — Any characteristic of a DISPLAY ITEM (color, LINESTYLE, CHARACTER FONT, etc.) or SEGMENT (VISIBILITY, DETECTABILITY, etc.)

B

Back Annotation — To extract information from a completed printed circuit board to create a CAD/CAM DISPLAY.

Background Display List — A DISPLAY LIST the REFRESH of which is not time-critical. See FOREGROUND DISPLAY LIST.

Baseline Fill — FILL between a string of VECTORS and a VECTOR specified as the "baseline".

Beam Penetration Crt — A CRT DISPLAY which produces color by varying the electron beam penetration of a multi-layer PHOSPHOR DISPLAY SURFACE.

Bit Plane The hardware used as a storage medium for IMAGE BIT MAPS.

Blackness A characteristic of color defining its percentage ranking on a scale from dark to light, specifying perceived brightness.

Blanked Region A bounded area in DISPLAY SPACE, inside which DISPLAY ELEMENTS are not visible.

Blanked Vector A VECTOR having no intensity, which effectively changes the CURRENT POSITION without creating a visible LINE SEGMENT.

Blinking The technique of alternately displaying and not displaying a DISPLAY ENTITY. A method of HIGHLIGHTING a DISPLAY ENTITY.

Bounding Box A rectangle whose dimensions are the same as the width and height of a symbol, and therefore can contain the entire symbol.

Boxing A visibility test incorporated in CLIPPING which uses a BOUNDING BOX to test the relationship of an entire symbol to the CLIPPING BOUNDARIES.

Brush A MARKER generated by PAINTING in COMPUTER ANIMATION.

Buffer A storage area which receives and subsequently releases transient data.

Button Device A button used as a GRAPHIC INPUT DEVICE.

C

CAD Computer Aided Design.

Calligraphic Line drawing, as opposed to RASTER SCAN. From the word calligraphy, the art of stroke drawing.

Calligraphic Display A DISPLAY DEVICE which can present IMAGES composed of LINE SEGMENTS.

CAM Computer Aid Manufacturing.

Cathode Ray Tube An electron tube in which electron beams projected onto its DISPLAY SURFACE excite the PHOSPHOR coating, producing luminous spots.

Center of Projection The common point from which all PROJECTORS emanate in a PERSPECTIVE PROJECTION.

Character An instance of a numeral, letter, or other linguistic, mathematical, or logical symbol.

Character Font A PRIMITIVE ATTRIBUTE of TEXT STRINGS defining the style of the character set.

Character Generator A hardware device which accesses character patterns in a ROM and generates them at user specified DISPLAY SURFACE positions.

Character Plane A PRIMITIVE ATTRIBUTE of TEXT STRINGS defining the plane in which CHARACTERS are generated.

Character Size A PRIMITIVE ATTRIBUTE of TEXT STRINGS defining the size of CHARACTERS in terms of the BOUNDING BOX.

Choice — A GRAPHIC INPUT DEVICE composed of a number of buttons from which a selection is made.

Clip Boundary — A boundary in DISPLAY SPACE, beyond which any portion of a DISPLAY ELEMENT will not be visible.

Clipping — The process of determining which portion or portions of a DISPLAY ELEMENT lie outside the specified CLIP BOUNDARY and making them invisible.

Coded Graphics — The specification of a DISPLAY as a set of DISPLAY INSTRUCTIONS.

Coherence — A property used in RASTER SCAN which recognizes that adjacent PIXELS are likely to be similar in characteristics.

Color Look-Up Table — A table designed to provide a range of colors by defining different mixtures of the color components. A component in indirect color specification schemes, where colors are specified in terms of elements in the table

Color Map — See COLOR LOOK-UP TABLE.

Color Space — A conceptual geometric model used to describe the characteristics of color: i.e., HUE, WHITENESS, BLACKNESS; RGB; HUE, SATURATION, LIGHTNESS.

COM — Computer Output Microfilm.

COM Recorder — A DISPLAY DEVICE for placing DISPLAYS on microfilm.

Comparator — A device which compares the proximity of a CURSOR to the VECTOR currently being drawn.

Component — A CAD/CAM MARKER which has physical meaning, i.e. resistor, capacitor, switch.

Composite Color — A color described in terms of its HUE, WHITENESS, and BLACKNESS, and encoded in a single VIDEO SIGNAL.

Composite Video — A single VIDEO SIGNAL encoding RGB data. See NTSC CONVERTER.

Computer Animation — The use of computer GRAPHICS to generate motion pictures.

Computer Independent Graphics — A GRAPHICS PACKAGE which can be used on more than one type of computer.

Construction Plane — A plane in a CAD/CAM DISPLAY used for the projection of digitized information.

Context Switching — To control the visibility of LAYERS in a CAD/CAM DISPLAY by shifting between groups that share common attibutes.

Contrast — The ratio of the highest available INTENSITY LEVEL to the lowest.

Contrast Enhancement — A linear expansion of the GRAY SCALE.

Contrast Stretching — To use DENSITY SLICING to emphasize portions of a black and white DISPLAY.

Control Dial — A VALUATOR DEVICE whose inputs are determined by an incremental scale the user assigns to its rotatable movements.

Coordinate — The location of a point in terms of units from the specified ORIGIN.

Core System — A proposed graphics standard developed by the ACM Special Interest Group on Graphics (SIGGRAPH).

Cross Hairs — Two intersecting perpendicular lines incorporated in a CURSOR, with the intersect being used to indicate desired DEVICE COORDINATES.

Cross Hatching — To FILL an area of the DISPLAY SURFACE bounded by VECTORS with a pattern of crisscrossed LINE SEGMENTS.

CRT — Cathode Ray Tube.

CRT Display — A DISPLAY DEVICE employing a CATHODE RAY TUBE.

Current Position — The beam position on the DISPLAY SURFACE prior to invoking a DISPLAY INSTRUCTION.

Cursor — A recognizable DISPLAY ENTITY that can be moved about the DISPLAY SURFACE by a GRAPHIC INPUT DEVICE to return either DEVICE COORDINATES or a PICK STACK. See PUCK.

Cut Plane — A plane which intersects a three dimensional OBJECT at a specified point, used to view a cross section at that location.

D

Data Tablet — A flat surfaced GRAPHIC INPUT DEVICE used with a STYLUS for INKING and CURSOR movement, or with a PUCK for digitizing.

Decluttering — The selective erasure of DISPLAY ITEMS when the DISPLAY is too dense to easily discern details.

Delta Gun — See TRIAD.

Density Slicing — To assign RGB values to black and white VIDEO SIGNAL levels.

Depth Queuing — A technique used to suggest depth in a three dimensional DISPLAY ITEM by varying INTENSITY LEVELS in relation to distance from the VIEW POINT.

Detectability — A DYNAMIC SEGMENT ATTRIBUTE which determines if DISPLAY ITEMS can be identified by a PICK DEVICE.

Device Coordinate System — A coordiante system which represents the internal digital limits of the DISPLAY DEVICE. Typically uses integers with finite limits along each axis recognized by the DISPLAY DEVICE.

Device Driver — Device dependent software which generates DISPLAY INSTRUCTIONS from the invocations of a GRAPHICS PACKAGE.

Device Independent Graphics — A GRAPHICS PACKAGE which can be used on more than one type of DISPLAY DEVICE

Device Space	The area defined by the DEVICE COORDINATE SYSTEM.
Digital Vector Generator	Used with RASTER DISPLAYS to interpolate the straightest possible PIXEL string between specified ENDPOINTS.
Digitizer	A DATA TABLET that generates coordinate data from visual data through the use of a PUCK or STYLUS. A large DATA TABLET.
Dimensioning	To measure distances on a CAD/CAM DISPLAY.
Direct View Storage Tube	A type of CRT whose DISPLAY is maintained by a continuous flood of electrons.
Directed Beam	The technique used in CALLIGRAPHIC DISPLAYS to produce VECTORS by having the electron beam stroke them in a selected order.
Disable	A DISPLAY COMMAND which prevents further inputs from a GRAPHIC INPUT DEVICE.
Display	A collection of DISPLAY ITEMS presented on the DISPLAY SURFACE.
Display Background	The static backdrop against which DISPLAYS are presented.
Display Command	A processor generated instruction to the DISPLAY DEVICE.
Display Console	A configuration containing a DISPLAY DEVICE and any associated GRAPHIC INPUT DEVICES.
Display Cycle	See REFRESH CYCLE.

Display Device	An output device used to display computer-generated graphical data.
Display Element	See OUTPUT PRIMITIVE.
Display Entity	A logical grouping of OUTPUT PRIMITIVES which forms a recognizable unit on the DISPLAY SURFACE.
Display File	See DISPLAY LIST.
Display Foreground	That portion of the DISPLAY which has DISPLAY ITEMS accessable while in INTERACTIVE MODE.
Display Group	An assemblage of DISPLAY ENTITIES controlled as a unit.
Display Image	The portion of an IMAGE visible on the DISPLAY SURFACE at any one time.
Display Instruction	The coded information passed to the GRAPHICS PROCESSOR specifying the DISPLAY ITEMS to be drawn on the DISPLAY SURFACE.
Display Item	A DISPLAY ELEMENT, DISPLAY ENTITY, or DISPLAY GROUP.
Display List	A collection of DISPLAY INSTRUCTIONS assembled to create a DISPLAY.
Display Segment	See SEGMENT.
Display Space	The portion of the IMAGE SPACE which is viewable on the DISPLAY SURFACE.
Display Surface	That part of the DISPLAY DEVICE which actually displays grpahical data, e.g., a CRT, the plotting surface of a PLOTTER, or the film in a COM RECORDER.

Dithering To increase the variations of color or intensity on RASTER DISPLAYS by trading picture resolution for patterns of PIXEL ARRAYS.

Dot Matrix A pattern of dots taken from a two dimensional array.

Dot Matrix Plotter See RASTER PLOTTER.

Double Buffering A technique used to speed data access by alternatively addressing two BUFFERS; while one BUFFER is passing data, the other can receive data to be transmitted in the next access.

Dragging The INTERACTIVE MODE technique of moving a DISPLAY ITEM by TRANSLATING it along a path determined by a GRAPHIC INPUT DEVICE.

Draw The generation of a VECTOR by creating a LINE SEGMENT from the CURRENT POSITION to a specified ENDPOINT, which becomes the new CURRENT POSITION.

DRC Design Rules Checking.

Drum Plotter A PLOTTER whose DISPLAY SURFACE is a rotatable drum, and whose plotting head can only move parallel to the drum's axis of rotation, with movement at angles to that axis provided by the drum's rotation.

DVST Direct View Storage Tube.

Dynamic Range The ratio of the minimum to the maximum brightness of an INPUT IMAGE.

Dynamic Segment Attribute The ATTRIBUTES of a SEGMENT which can be changed after its creation: VISIBILITY, HIGHLIGHTING, IMAGE TRANSFORMATION, and DETECTABILITY.

E

Echo The mode of a GRAPHICS INPUT DEVICE which provides visual feedback to the OPERATOR, e.g., a CURSOR, TEXT STRINGS, etc.

Electron Gun The part of a CRT which focuses and emits the electron beam.

Electrostatic Plotter A RASTER PLOTTER which produces DISPLAY IMAGES on paper sensitized to electrostatic charges.

Element See DISPLAY ELEMENT.

Elementary Diagram A CAD/CAM ES DISPLAY containing COMPONENTS, LOGIC ELEMENTS, WIRE NETS, ANNOTATION, etc.

Enable To cause a GRAPHICS INPUT DEVICE to be in the mode which marks it as ready to produce input.

Endpoint Either of the POINTS that mark the ends of a LINE SEGMENT.

Endpoint Matching The accuracy of the VECTOR GENERATOR in drawing two or more VECTORS emanating from the same point.

ES Electrical Schematic.

Event An OPERATOR action which prompts an EVENT DEVICE to produce an input.

Event Device — A GRAPHIC INPUT DEVICE which notifies a user task of an EVENT, by placing an EVENT REPORT in the EVENT QUEUE.

Event Queue — A list of EVENT REPORTS, generated in the order of their occurrence.

Event Report — The status of an EVENT DEVICE when an EVENT occurred.

Exploring Spot — The point of focus of the electron beam of an IMAGE DIGITIZER on the INPUT IMAGE.

F

FEM — FINITE ELEMENT MODEL.

Fill — To fill an area of the DISPLAY SURFACE bounded by VECTORS, e.g. with a solid color or a pattern of LINE SEGMENTS.

Finite Element Model — A mathematical model of a continuous object which divides the object into an array of discrete elements for the purpose of simulated structural analysis.

Fixing — The positioning of a DISPLAY ITEM at a set location after DRAGGING.

Flatbed Plotter — A PLOTTER with a flat DISPLAY SURFACE fully accessable by the plotting head.

Flicker — A noticeable flashing of the DISPLAY during each REFRESH, caused when the REFRESH interval exceeds the PHOSPHOR PERSISTENCE.

Flying Spot — See EXPLORING SPOT.

Flying Spot Scanner — A device for scanning a picture to record it as a PIXEL ARRAY.

Foreground Display List — A DISPLAY LIST whose REFRESH is time-critical. May be REFRESHED several times for each REFRESH of a BACKGROUND DISPLAY LIST.

Frame — One REFRESH of a RASTER DISPLAY IMAGE.

Frame Buffer — See IMAGE BIT MAP.

Frame Update Rate — Time required to rewrite an entire FRAME BUFFER.

Function Button — See FUNCTION SWITCH.

Function Key — A key on a FUNCTION PAD which causes execution of special program functions defined by the user.

Function Pad — A GRAPHIC INPUT DEVICE with user programmable FUNCTION KEYS.

Function Switch — A button on a BUTTON DEVICE which can operate in either MOMENTARY or LATCHABLE mode, and whose value may be retained.

Fusion Point — The point at which the REFRESH RATE reaches a frequency that makes a DISPLAY appear steady, as opposed to FLICKER.

G

Graphic Input — Any inputs entered by a user through a GRAPHIC INPUT DEVICE while in INTERACTIVE MODE.

Graphic Input Device — Hardware which allows the user to enter data, or PICK a DETECTABLE DISPLAY ITEM.

Graphic Primitive See OUTPUT PRIMITIVE.

Graphics The visual presentation of data as a series of OUTPUT PRIMITIVES.

Graphics Package A series of software routines which provide the user access to the graphics hardware for the purpose of generating a DISPLAY.

Graphics Processor A controller which accesses the DISPLAY LIST, interprets the DISPLAY INSTRUCTIONS, and passes COORDINATES to the VECTOR GENERATOR.

Gray Scale An ordered description of the tonal levels of an INPUT IMAGE.

Grid Uniformly spaced points in two or three dimensions within which an OBJECT may be defined.

H

Half-Tone Images A DISPLAY of three dimensional OBJECTS using shaded surfaces.

Hardcopy A copy of a DISPLAY on a permanent medium, e.g., paper or microfilm.

Hatching To FILL an area of the DISPLAY SURFACE bounded by VECTORS with a pattern of parallel LINE SEGMENTS.

Hidden Lines The LINE SEGMENTS which should not be visible to a viewer of a three dimensional DISPLAY ITEM because they are "behind" other parts of the same or other DISPLAY ITEMS.

Hidden Objects The OBJECTS in a three dimensional DISPLAY which should not be visible to a viewer because thay are obscured by other OBJECTS.

Hidden Surfaces The surfaces of a three dimensional DISPLAY ITEM which should not be visible to a viewer because they are obscured by other surfaces of the same or other DISPLAY ITEMS.

Highlight To force a DISPLAY ITEM to stand out by BLINKING or varying its INTENSITY.

Hit Detection The returning of a PICK STACK when a valid PICK is make by a GRAPHIC INPUT DEVICE.

Hither Plane The front clipping plane used in Z-CLIPPING to define a finite VIEW VOLUME.

Homogeneous Coordinates Used in matrix TRANSFORMATIONS to convert OBJECTS described in N-space to a respresentation described in N + 1 space, i.e. X, Y, Z becomes WX, WY, WZ, W, where W is a homogeneous scale factor.

Horizontal Retrace Turning off and repositioning the ELECTRON BEAM down and to the left during RASTER SCAN to begin the sweep of the next SCAN LINE.

Hue A characteristic of color which allows it to be named, i.e., red, yellow, green, blue, and which is often defined by an angle representing its graduation.

I

Image — A view of an OBJECT.

Image Bit Map — A digital representation of a DISPLAY IMAGE as a pattern of bits, where each bit maps to one or more PIXELS. Multiple bit maps may be used in color graphics to assign values to each PIXEL, which are used as indices into the COLOR LOOK-UP TABLE, if one exists.

Image Data — Data composed of an array of points, each with a specified color or INTENSITY LEVEL. See PIXEL.

Image Digitizer — A video camera tube incorporating an electron beam to scan an INPUT IMAGE, sense the light emitted, and produce VIDEO SIGNALS.

Image Enhancement — A technique which displays user selected portions of an INPUT IMAGE in great detail.

Image Graphics — The creation of an IMAGE from data stored in PIXEL form.

Image Plane — The plane containing an INPUT IMAGE.

Image Processing — To input IMAGE DATA to a computer and process it for output to a DISPLAY DEVICE.

Image Space — The VIEW PLANE defined in WORLD COORDINATES.

Image Transformations — To apply a TRANSFORMATION FUNCTION to an IMAGE after projection to the DISPLAY SPACE.

Imaging — See IMAGE PROCESSING.

In-Line Crt — A color CRT DISPLAY whose electron guns are in an in-line configuration and whose PHOSPHORS and SHADOW MASK are arranged accordingly.

Inbetweening — To generate the movements of a figure between two specified extremes in COMPUTER ANIMATION.

Incremental Plotter — A PLOTTER which produces a DISPLAY in discrete steps defined by the limited movements of the plotting head.

Incremental Vector — A VECTOR defined by a relative component and an absolute component.

Ink Jet Plotter — A PLOTTER which uses electrostatic technology to first atomize a liquid ink and then control the number of droplets that are deposited on the plotting medium.

Inking — The technique of using a GRAPHIC INPUT DEVICE to sketch freehand with a STYLUS.

Input Image — A picture to be digitized.

Instancing — The repetitious use of a MARKER or SUBROUTINE on a DISPLAY.

Intensity — See BLACKNESS.

Intensity Level — One of a discrete set of brightness levels attainable with a CRT.

Interactive Graphics — A method which allows users to dynamically modify DISPLAYS through the use of GRAPHIC INPUT DEVICES.

Interactive Mode — A setting which permits a DISPLAY CONSOLE to be used for INTERACTIVE GRAPHICS.

Interconnection — A LINE SEGMENT used in CAD/CAM DISPLAYS to connect DISPLAY ENTITIES having logical, electrical, or mechanical functions.

Interlace — A RASTER SCAN technique which alternately REFRESHES the even and odd SCAN LINES with each pass.

J

Joystick — A GRAPHIC INPUT DEVICE which employs a moveable lever to control the position of a CURSOR, for returning LOCATOR or PICK information.

K

Kernel — A subset of routines from a GRAPHICS PACKAGE which permits construction of elementary DISPLAYS.

Key — A button on a KEYBOARD DEVICE which transmits a single CHARACTER or control information to the user program.

Key-Frame Animation — To animate figures by defining successive FRAMES containing slightly changing fundamental movements.

Keyboard Device — A GRAPHIC INPUT DEVICE which allows the user to enter CHARACTERS or other key-driven values.

L

Laser Plotter — A PLOTTER which produces DISPLAY IMAGES on photographic film, in RASTER or VECTOR formats, using a laser.

Latchable — A mode setting for FUNCTION SWITCHES which allows a switch to toggle between two states when depressed by a user.

Layer — Logical subdivisions of the data contained in a two dimensional CAD/CAM DISPLAY, such that the subdivisions may be viewed individually or overlaid and viewed in groups.

Layout — A completed CAD/CAM DISPLAY drawn to SCALE.

Light Button — A DETECTABLE DISPLAY ITEM which functions as a BUTTON DEVICE.

Light Pen — A GRAPHIC INPUT DEVICE which generates a HIT DETECTION when a PICK is made while pointed at a DETECTABLE DISPLAY ITEM.

Lightness — See BLACKNESS.

Line Follower — A GRAPHIC INPUT DEVICE which detects and traces lines in VECTOR format. Branching and bridging decisions are handled either by sophisticated software or through OPERATOR intervention.

Line Segment — A portion of a line bounded by two ENDPOINTS.

Line Style — A PRIVITIVE ATTRIBUTE of lines which defines whether they are to be solid or dashed, and a possible dash pattern.

Line Type — See LINE STYLE.

Line Width — A PRIVITIVE ATTRIBUTE which defines the thickness of a LINE SEGMENT.

LIS — Large Interactive Surface.

Locate — To provide COORDINATE information with a LOCATOR DEVICE.

Locator Device — A GRAPHIC INPUT DEVICE, such as a JOYSTICK or DATA TABLET, which uses a CURSOR to provide COORDINATE information.

Logic Element — A CAD/CAM MARKER which has logical meaning, i.e. gate, flip-flop.

M

Mapping Function — A method of transforming an IMAGE definition expressed in one COORDINATE system to another.

Marker — A user defined symbol which can be invoked repeatedly on the DISPLAY SURFACE.

Memory Management — A scheme used to allocate and de-allocate memory to the SEGMENTS composing a DISPLAY LIST.

Menu — A list of program execution options appearing on the DISPLAY SURFACE which prompts the user to choose one or more through the use of a GRAPHIC INPUT DEVICE.

Metafile — A device-independent file for storing a DISPLAY and transporting it from one system to another.

Mirroring — To create a mirror image of a DISPLAY ITEM.

Model — The definition of an OBJECT in WORLD COORDINATES.

Model Space — The WORLD COORDINATE SYSTEM in use by a particular MODEL.

Modelling System — A system which allows MODELS to be defined and transformed using WORLD COORDINATES.

Modelling Transformation — See WORLD COORDINATE TRANSFORMATION.

Momentary — A mode setting for FUNCTION SWITCHES which places a switch in an active state only while it is pressed by the user.

Mouse — A hand held device used with a DATA TABLET that positions a CURSOR on the DISPLAY SURFACE by the movement of two wheels against the tablet's surface. The wheels are perpendicular to one another, with one for the X COORDINATE and one for the Y COORDINATE.

Move — To change the CURRENT POSITION without producing an OUTPUT PRIMITIVE.

N

Name — To associate a label with a DISPLAY GROUP to allow it to be identified and addressed.

NDC — NORMALIZED DEVICE COORDINATES.

Net — A logical linking of PINS in a CAD/CAM DISPLAY using INTERCONNECTIONS.

New Frame Action — A REFRESH of the DISPLAY SURFACE which produces an updated DISPLAY.

Node — The intersection of two or more INTERCONNECTIONS.

Non-Interlace — A RASTER SCAN technique which REFRESHES every SCAN LINE with each pass.

Non-Retained Segment — The SEGMENT which is open when all RETAINED SEGMENTS are closed.

Normalized Device Coordinate Space — The addressable area defined in terms of NORMALIZED DEVICE COORDINATES.

Normalized Device Coordinates — Device independent COORDINATES in the range of 0 to 1 which are mapped to the DEVICE SPACE.

NTSC Converter — Used to encode VIDEO SIGNALS into National Television Standard Committee COMPOSITE VIDEO. Normally RGB signals are converted to a single color VIDEO SIGNAL.

O

Object — A DISPLAY ITEM created with OUTPUT PRIMITIVES described in WORLD COORDINATES.

Operator — The user of a DISPLAY CONSOLE in INTERACTIVE MODE.

Optical Scanner — See IMAGE DIGITIZER.

Ordered Dither — Setting the INTENSITY LEVEL or color for each PIXEL according to its relation to a set of threshold values applied to the PIXEL ARRAY.

Origin — The point in a COORDINATE system whose components are all zero.

Orthographic Projection — A PARALLEL PROJECTION whose direction is determined by a VECTOR perpendicular to the VIEW PLANE.

Output Primitive — A basic graphical entity, i.e. a POINT, LINE SEGMENT, CHARACTER, MARKER, or TEXT STRING. A basic component of a DISPLAY ENTITY.

Overlay — A pattern used as the DISPLAY BACKGROUND.

P

P & ID — Piping and Instrumentation Diagram.

Painting — A technique similar to INKING, but used only on RASTER DISPLAYS where LINE WIDTH and color may vary.

Pan To TRANSLATE horizontally.

Parallax The apparent displacement of a DISPLAY ITEM from where the viewer perceives it and where a LIGHT PEN is pointing.

Parallel Projection A projection in which the PROJECTORS are all parallel to a specified VECTOR.

Passive Graphics A method allowing no OPERATOR dynamic interaction with a DISPLAY.

Passive Mode A setting which specifies a DISPLAY CONSOLE as usable for PASSIVE GRAPHICS.

Pattern Fill Repitively using a user defined PIXEL ARRAY to perform FILL.

Pel Picture element. See PIXEL.

Perspective Projection A projection in which the PROJECTORS all originate at a specified CENTER OF PROJECTION.

Phosphor One of a number of chemical compounds used to coat the DISPLAY SURFACE of a CRT and which glow when excited by an electron beam.

Phosphor Persistence A measure of the time it takes for a PHOSPHOR'S brightness to drop to one-tenth of its initial value. The tendency of a PHOSPHOR to continue to emit light when no longer excited by an electron beam.

Pick An EVENT triggered by a PICK DEVICE which generates an EVENT REPORT containing the PICK IDENTIFIER of the detected DISPLAY ITEM and the name of the SEGMENT containing it.

Pick Device An EVENT DEVICE, such as a LIGHT PEN or a LOCATOR DEVICE with a COMPARATOR, which causes PICKS when pointed at DETECTABLE DISPLAY ITEMS.

Pick Identifier A NAME associated with a DETECTABLE DISPLAY ITEM.

Pick Label See PICK IDENTIFIER.

Pick Stack The information returned by a PICK DEVICE in an EVENT REPORT, including the SEGMENT name, PICK IDENTIFIER, and the DISPLAY ITEM COORDINATES.

Picture Structure The way in which a DISPLAY is subdivided into SEGMENTS and SUBROUTINES for use in INTERACTIVE MODE.

Pin The connection points on LOGIC ELEMENTS and COMPONENTS in CAD/CAM DISPLAYS.

Pixel The discrete DISPLAY ELEMENT of a RASTER DISPLAY, represented as a single point with a specified color or INTENSITY LEVEL.

Pixel Array See RASTER.

Pixel Replication To repeat each PIXEL in a DISPLAY when an OPERATOR ZOOMS in.

Plasma Panel A type of DISPLAY DEVICE whose DISPLAY SURFACE consists of a matrix of gas filled cells which can be turned on and off individually, and which remain "on" until turned "off".

Plotter A computer controlled device which produces a HARDCOPY of a DISPLAY.

Point A LINE SEGMENT of zero length.

Polygon Fill FILL performed on any defined polygon.

Posting Setting the VISIBILITY SEGMENT ATTRIBUTE "on".

Primitive See OUTPUT PRIVITIVE.

Primitive Attribute A characteristic of an OUTPUT PRIMITIVE: i.e. CHARACTER SIZE, LINE STYLE, BLINK rate, etc.

Projector A line passing through an OBJECT to intersect with the VIEWPLANE in a projection.

Prompt Any action of the DISPLAY CONSOLE which indicates an OPERATOR reaction is needed, normally in the form of a message or MENU on the DISPLAY SURFACE.

Properties See PRIMITIVE ATTRIBUTE.

Pseudo Color Color assigned to non-color data; i.e., using color for different stress values in a FEM.

Puck A hand held device with a transparent portion containing CROSS-HAIRS that is used for inputting COORDINATE data from a DATA TABLET through the use of programmable buttons. See CURSOR.

R

Raster A rectangular matrix of PIXELS.

Raster Count The number of SCAN LINES in a RASTER DISPLAY.

Raster Display A CRT DISPLAY whose DISPLAY SURFACE is covered by a RASTER and which generates DISPLAYS using RASTER SCAN techniques.

Raster Plotter A PLOTTER which produces DISPLAYS in DOT MATRIX form.

Raster Scan The generation of a DISPLAY on a RASTER DISPLAY by having the electron beam follow a set pattern through the SCAN LINES, applying varying color or intensities to each individual PIXEL.

Raster Unit The physical distance between the midpoints of two adjacent PIXELS.

Read To query a GRAPHIC INPUT DEVICE and await OPERATOR action.

Refresh The process of repeatedly drawing a DISPLAY on the DISPLAY SURFACE of a REFRESH TUBE.

Refresh Cycle One REFRESH of the DISPLAY SURFACE.

Refresh Display A DISPLAY DEVICE employing a REFRESH TUBE which permits dynamics due to high REFRESH RATE.

Refresh Rate The time needed for one REFRESH of the DISPLAY SURFACE.

Refresh Tube A CRT which must be REFRESHED in order to maintain a DISPLAY.

Relative Vector A VECTOR whose ENDPOINTS are specified in reference to the CURRENT POSITION.

Repaint To REFRESH a DISPLAY SURFACE with an updated DISPLAY.

Repeatability The accuracy of an ANALOG VECTOR GENERATOR in minimizing the deviation from precise overlap when redrawing VECTORS.

Reproducing Spot The point of contact of the electron beam of a RASTER DISPLAY with the DISPLAY SURFACE.

Resolution The precision of a CRT, measured as the number of line pairs distinguishable across the DISPLAY SURFACE.

Retained Segment A user NAMED and defined SEGMENT whose SEGMENT ATTRIBUTES may be modified at any time.

Reverse Video To specify a color by reversing the value of an existing color to yield its complement.

RGB Color A color described in terms of its red, green, and blue INTENSITY LEVELS.

Right Complement See REVERSE VIDEO.

Roam To TRANSLATE a WINDOW about the VIEW PLANE.

Rotate To transform a DISPLAY or DISPLAY ITEM by revolving it around a specific axis.

Routing To position INTERCONNECTIONS in a CAD/CAM DISPLAY.

Rubber Band Line A LINE SEGMENT that extends from a specified fixed point to a CURSOR, and moves along with the CURSOR.

Rubberstamping To invoke a BRUSH.

Run Length Encoding A SCAN CONVERSION technique used to compress SCAN LINE information by storing counts of the number of identical consecutive PIXELS and their respective colors or intensities across each line.

S

Sample To query a GRAPHIC INPUT DEVICE to determine its current state.

Sampled Device A GRAPHIC INPUT DEVICE which a user task may SAMPLE.

Saturation See WHITENESS.

Scale (1) To transform the size or shape of a DISPLAY or DISPLAY ITEM by modifying the COORDINATE dimensions.

Scale (2) The ratio of the actual dimensions of a MODEL to the true dimensions of the subject represented.

Scan Conversion The process of converting a DISPLAY to an IMAGE BIT MAP.

Scan Line A horizontal line of PIXELS on a RASTER DISPLAY that is swept by the electron beam during REFRESH.

Scanning Pattern The path followed by an EXPLORING SPOT.

Scanning Spot See EXPLORING SPOT.

Scissoring See CLIPPING.

Screen Coordinate System See DEVICE COORDINATE SYSTEM.

Scrolling To TRANSLATE TEXT STRINGS or GRAPHICS vertically.

Segment A NAMED portion of the DISPLAY LIST that defines a DISPLAY ITEM.

Segment Attribute A characteristic of a SEGMENT, i.e. DETECTABILITY, VISIBILITY, etc.

Selective Erase The ability to delete portions of a DISPLAY without affecting the remainder.

Shading (1) IMAGE PROCESSING technique which indicates light sources in a three-dimensional IMAGE.
(2) Changes in sensitivity of the video camera tube of an IMAGE DIGITIZER.

Shadow Mask A metal plate positioned behind the DISPLAY SURFACE of a color RASTER DISPLAY and pierced with small holes, such that when the TRIAD is focused on a hole, the electrons from each gun only strike their respective PHOSPHORS.

Shielding To define an opaque VIEWPORT or WINDOW in which to display a MENU, a title, or a message to the OPERATOR.

Signal See NET.

Signal Highlighting To distinguish the PINS in a NET.

Soft Copy A copy of a DISPLAY in video form, as on videotape.

Spot Size The smallest area on the DISPLAY SURFACE of a CRT which can be excited by an electron beam, determining the line width on CALLIGRAPHIC DISPLAYS.

Static Segment Attribute The SEGMENT ATTRIBUTE which specifies what TRANSFORMATION FUNCTIONS are available for the SEGMENT.

Stipple Pattern The pattern FILL chosen in DITHERING.

Storage Tube A CRT which maintains a DISPLAY on the DISPLAY SURFACE without REFRESH.

Stroke Writing See CALLIGRAPHIC.

Stylus A device analogous to a pencil which is used in conjunction with a DATA TABLET to input COORDINATE information.

Subfigure See MARKER.

Subroutine A NAMED DISPLAY ITEM description contained in the DISPLAY LIST, used to create multiple views of the item without repeating the DISPLAY INSTRUCTIONS.

Subtractive Color Color produced by filtering out the red, green, or blue color components of another color.

Surface Of Revolution The surface which results from tracing the path of a curve as it is rotated about an axis.

Surface Patch A piecewise component of the surface of a three dimensional OBJECT.

Sweep Plane The plane defined by the ENDPOINTS of a LINE SEGMENT and the VIEW POINT.

Tablet See DATA TABLET.

Text String A collection of CHARACTERS.

Thematic Mapping Using maps as a DISPLAY BACKGROUND over which to display geographically oriented information.

Thumbwheel A GRAPHIC INPUT DEVICE consisting of a rotatable dial which controls the movement of a line across the DISPLAY SURFACE, horizontally or vertically. They are normally found in pairs, one horizontal and one vertical, and are used to input COORDINATE data.

Touch Sensitive Display A DISPLAY DEVICE whose DISPLAY SURFACE can register physical contact.

Track Ball A GRAPHIC INPUT DEVICE which employs a mounted rotatable ball tc control the position of a CURSOR, used for producing COORDINATE data.

Tracking To follow the movements of a PICK DEVICE on the DISPLAY SURFACE.

Tracking Symbol A CURSOR on the DISPLAY SURFACE which indicates where a PICK DEVICE is pointing.

Transformation Function A function which modifies a DISPLAY by introducing ROTATION, SCALING or TRANSLATION.

Transformation Matrix The matrix defining the multiplications to be performed on existing VECTORS to produce the desired TRANSFORMATION FUNCTION.

Translate To transform a DISPLAY ITEM on the DISPLAY SURFACE by repositioning it to another COORDINATE location.

Triad Three ELECTRON GUNS grouped in a triangle for use with a SHADOW MASK, with each gun responsible for either the red, green, or blue color component.

True Scale To introduce more detail to a DISPLAY when an OPERATOR ZOOMS in.

Tumbling — To view a three dimensional OBJECT by continually changing its axis of rotation.

U

Unposting — Setting the VISIBILITY SEGMENT ATTRIBUTE to "off".

V

Valuator Device — A GRAPHIC INPUT DEVICE, such as a CONTROL DIAL, that inputs scalar values within a user defined range.

Vector — A directed LINE SEGMENT.

Vertical Retrace — Turning off and repositioning the ELECTRON BEAM to the upper left corner of the DISPLAY SURFACE after the last SCAN LINE has been drawn during RASTER SCAN.

Video Signal — An electrical voltage representing IMAGE DATA in terms of its brightness.

View Plane — The projection plane used in three dimensional VIEWING OPERATIONS.

View Plane Distance — The distance from the VIEW PLANE to the VIEW REFERENCE POINT.

View Plane Normal — A VECTOR specified relative to the VIEW REFERENCE POINT, to which the VIEW PLANE is perpendicular.

View Point — The originating point of a field of view.

View Reference Point — A COORDINATE point near the OBJECT being viewed, normally the ORIGIN.

View Site — A COORDINATE point on the OBJECT being viewed which intersects with the VIEWING VECTOR.

View Surface — A two dimensional DISPLAY SURFACE mapped to NORMALIZED DEVICE COORDINATE SPACE.

View Up Vector — A VECTOR specified in WORLD COORDINATES and relative to the VIEW REFERENCE POINT, which if projected onto the VIEW SURFACE would be upright. Used to define a WINDOW's rotation.

View Volume — The portion of the WORLD COORDINATE SYSTEM to be projected onto the VIEW PLANE, whose boundaries are defined through WINDOW CLIPPING and Z-CLIPPING.

Viewing Direction — The inclination of a WINDOW with respect to the axes of a WORLD COORDINATE SYSTEM as defined in the VIEWING OPERATION.

Viewing Operation — The process of defining and using a mapping from WORLD COORDINATES to NDC or DEVICE COORDINATES.

Viewing Transformation — The conversion of an OBJECT defininition to NORMALIZED DEVICE COORDINATES using the VIEWING OPERATION.

Viewing Vector — A VECTOR emanating from the VIEW POINT and passing perpendicular through the VIEW PLANE to define the VIEWING DIRECTION.

Viewport — A specified rectangle on the VIEW SURFACE within which a WINDOW'S contents are displayed.

Virtual Coordinate System — The result of mapping a portion of the WORLD COORDINATE SYSTEM to the finite limits of the DEVICE SPACE.

Visibility — A DYNAMIC SEGMENT ATTRIBUTE which defines if a SEGMENT is currently visible on the DISPLAY SURFACE.

Voice Input Device — A GRAPHICS INPUT DEVICE which accepts and interprets vocal data.

W

White Graphics — To overlay IMAGE DATA with VECTOR data.

Whiteness — A characteristic of color defining its percentage difference from a gray of the same BLACKNESS.

Window — The specified area on the VIEW PLANE containing the projections to be displayed.

Window Clipping — The bounding of a VIEW VOLUME in the X and Y directions by passing PROJECTORS through the corners of the WINDOW to define its sides.

Wire Frame — An IMAGE of a three dimensional OBJECT displayed as a series of LINE SEGMENTS outlining its surface, including HIDDEN LINES.

Wire Net — A subset of NET which shows those INTERCONNECTIONS having common characteristics.

Wiring Elementary — See ELEMENTARY DIAGRAM.

Workstation — See DISPLAY CONSOLE.

World Coordinate System — The device independent coordinate system used to define OBJECTS meant for display.

World Coordinate Transformation — A transformation which transforms the WORLD COORDINATE SYSTEM of a MODEL to the default WORLD COORDINATE SYSTEM of a GRAPHICS PACKAGE which is in effect immediately prior to a VIEWING OPERATION.

Wraparound — The positioning of a DISPLAY ITEM such that it overlaps the border of the DEVICE SPACE, resulting in it being displayed on the opposite side of the DISPLAY SURFACE.

Write Protect — A feature which prevents the updating of a BIT PLANE.

Yon Plane — The back clipping plane used in Z-CLIPPING to define a finite VIEW VOLUME.

Z

Z-Clipping

The bounding of a VIEW VOLUME in the Z direction by defining a HITHER PLANE and a YON PLANE parallel to the VIEW PLANE.

Zoom

To SCALE a DISPLAY or DISPLAY ITEM so it appears to either approach or recede from the viewer.

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